

REMARKS

Claims 1-14 have been cancelled. Claims 15-31 remain in the case under prosecution.

The Amendment of Claim 26

Claim 26 was objected to by the Patent Office because the expression "one-dimensional pores" was unnecessarily repeated. Claim 26 has been amended to correct this inadvertent error.

The Rejection of Claims 15, 22 and 23 Under 35 USC 103(a)

Claims 15, 22 and 23 stand rejected as obvious under 35 USC 103(a) over U.S. Patent No. 6,544,407 (referred to hereafter as Calemma et al.) in view of EP 0323092 A2 (referred to hereafter as Boucher et al.). Applicants respectfully disagree and argue that the invention as covered in Claims 15, 22 and 23 may be patentably distinguished from this combination of references.

The primary reference, Calemma et al., describes a process for preparing middle distillates by selectively hydrocracking a Fischer-Tropsch derived feed containing a mixture of hydrocarbons having a broad boiling range. Calemma et al. teaches the use of an amorphous silica/alumina catalyst which selectively hydrocracks the 370 degree C plus fraction to middle distillates. Calemma et al. is not concerned with the preparation of lubricating base oils. As noted in column 10 at lines 33 and 34, the cracking conversion of the high-boiling fraction, i.e., the fraction boiling above 370 degrees C, should be a minimum of 40% and preferably from 60% to 90%. Thus in the process taught by Calemma et al. the majority of that hydrocarbon fraction from which lubricating base oils are

obtained will be cracked to kerosene and gas oil (collectively referred to in the present application as diesel).

The secondary reference, Boucher et al., as noted in the Office Action discloses the hydrofinishing of a dewaxed product.

Claims 15, 22 and 23 may be distinguished from Calemma et al. in at least four ways. They are:

1. Applicants' claimed invention utilizes a hydroisomerization step to prepare the products of the invention while Calemma et al. uses a hydrocracking step.
2. Calemma et al. employs an amorphous silica/alumina catalyst in carrying out the hydrocracking step while Applicants use a molecular sieve in performing the hydroisomerization reaction.
3. Along with diesel Applicants' process makes a high quality lubricating base oil while Calemma et al. is only concerned with making diesel.
4. The properties of the final products of the Calemma et al. process and Applicants' invention differ significantly.

Calemma et al. subjects the hydrocarbon feed to a hydrocracking step which is described in column 6, lines 12 to 14, as a "high temperature catalytic treatment of a hydrocarbon mixture in the presence of hydrogen, in order to obtain a mixture with a lower boiling point." As already noted above, Calemma et al. states that the cracking conversion of the 370 degree C plus hydrocarbons should be at least 40% and preferably should be between 60 and 90% (See column 10, lines 33-34.). By contrast Applicants use a hydroisomerization step in

their process which is intended to achieve high conversion levels of the waxy 370 degree C plus fraction by isomerization to non-waxy isoparaffins while at the same time minimizing the conversion by cracking (See Applicants' disclosure at page 10, lines 20 to 22). This difference is especially significant due to the differing objectives of the two processes. Applicants' process is intended to produce lubricating base oils and a low pour point diesel. This is accomplished by the isomerization of both the diesel and 370 degree C plus fractions in the feed to low pour point diesel and lubricating base oil, respectively, with most of the cracked product from the isomerization of the 370 degree C plus material going to diesel. It should also be noted, that Applicants' process allows the flexibility to increase cracking of the highest boiling fraction, i.e., to produce more diesel and less lubricating base oil, if so desired, depending on the relative markets for those two products. This flexibility is not an option with the process taught in Calemma et al. The process of Calemma et al. is intended to produce middle distillates, i.e., kerosene and gas oil. Therefore, the 370 degree C plus hydrocarbons are cracked in the Calemma et al. process to lower boiling hydrocarbons which significantly reduces the amount of the high boiling material in the final product slate. Also note in Calemma et al. in column 10, lines 5 to 8, that the high boiling material is only "partially isomerized" and is "advantageously recycled to the hydrocracking step" suggesting the pour point of this material is too high for any other practical use. Applicants' claimed process is primarily intended to maximize the 370 degree plus hydrocarbons in the product slate by the isomerization of the hydrocarbon molecules as opposed to cracking them.

Calemma et al. employs an acidic amorphous silica/alumina catalyst containing a noble metal in carrying out the hydrocracking step. As already noted in the preceding discussion, this catalyst is said to be highly selective for the cracking of the 370 degree C plus hydrocarbons to middle distillates. The hydroisomerization catalysts used in Applicants claimed process are dual-function catalysts containing an acidic crystalline component and an active

metal. The crystalline component is either a SAPO or an intermediate pore zeolite. As already noted, the catalysts used in Applicants' invention are intended to minimize cracking while converting the waxy 370 degree C hydrocarbons by isomerization to isoparaffins. In one embodiment of the invention the catalyst contains a zeolite having one-dimensional pores (Claims 25 to 31). As noted in Applicants' specification on page 11, lines 24 to 30 such a catalyst is especially useful in preparing ultra-high VI lubricating base oils, i.e., a base oil having a VI of greater than 140. The catalysts used by Calemma et al. not only differ in their structure from the catalysts used in Applicants' invention but differ in their activity as well. The catalysts of Calemma et al. would not be suitable for preparing a low pour point, high VI lubricating base oil.

One of the primary products made using Applicants' process is a high quality lubricating base oil. The process described in Calemma et al. is only concerned with making kerosene and gas oil (diesel) and any unconverted 370 degree C plus hydrocarbons represent an undesirable residue. It is doubtful that this 370 degree C plus residue would be suitable for preparing a lubricating base oil and most certainly, it would not meet the specifications for a ultra-high VI, low pour point lubricating base oil. Accordingly, it would not be obvious to one skilled in the art that the process of Calemma et al. could be used for preparing lubricating base oils which represent one of the primary and most important products made using Applicants' claimed process.

One of the advantages of Applicants' process is that it is possible to prepare lubricating base oils characterized by very low pour points and very high VI. On page 16 in Table 2, Applicants have listed the actual pour points and VI for a lubricating base oil prepared using the present invention. It will be noted that the pour point was -12 degrees C and the VI was 158. This is an ultra-high VI lubricating base displaying premium cold flow properties. Although Calemma et al. does not give the pour point or VI of the 370 degree plus material

that remains after collecting the middle distillate fractions using his process, one would expect that the properties of this high boiling residue would be no better than the VI and pour point shown in Applicants' Table 2 for the conventional commercial catalyst. The pour point in this instance was found to be +13 degrees C and the VI was 133. Neither figure is near the values obtained using Applicants' process. As noted above, Calemma et al. supports this argument when the reference states that the 370 degree C plus material is preferably recycled to the cracking unit which suggests that the material is unsuitable for use as a lubricating base oil. Lubricating base oils generally have a significantly higher market value than kerosene or gas oil, so it would make no sense to further crack this fraction if it were useful as a lubricating base oil.

Diesel produced using Applicant's claimed process will also have a low pour point, i.e., below -30 degrees C (See page 6, line 30). Once again, referring to Table 2 in Applicants' specification, it should be noted that the cloud point of the diesel prepared using the present invention was found to be -35 degrees C. While the actual pour point of the diesel was not determined, the pour point will always be lower than the cloud point and consequently, the pour point of the diesel recovered from Applicants' process will be below -35 degrees C. It may be noted that Calemma et al. in column 10, lines 45-46, states that the pour point of the gas oil fraction made using the process disclosed in this reference ranges from -9 to -30 degrees C. The lowest pour point for gas oil actually prepared by the Calemma et al. process as given in Tables 4 and 5, columns 18 and 20 respectively, is -28 degrees C, with the majority falling within the range of from -12 to -22 degrees C. This is well above the highest pour point for diesel obtained using Applicants' invention.

The Boucher et al. reference describes hydrofinishing of a dewaxed Fischer-Tropsch Product but otherwise fails to overcome the limitations of Calemma et al. Therefore, it is submitted that Claim 15, 22 and 23 are

patentable over the combination of Calemma et al. and Boucher et al. Therefore withdrawal of the rejection under 35 USC 103(a) is respectfully requested.

The Rejection of Claims 16-21 and 24-31
Under 35 USC 103(a)

Claims 16-21 and 24-31 stand rejected as obvious under 35 USC 103(a) over Calemma et al. and Boucher et al. further in view of U.S. Patent No. 5,135,638 (referred to hereafter as Miller). Aside from the problems already discussed above with Calemma et al. and Boucher et al., Applicants submit that the combination of Miller with Calemma et al. and Boucher et al. is not proper because one skilled in the art would not be led to substitute the catalyst described in Miller into the process taught in Calemma et al.

Miller teaches the hydroisomerization of waxes to produce ultra-high VI lubricating base oil. Miller also describes the use of SAPO-11 and certain intermediate pore zeolites in his process. Although Miller mentions Fischer-Tropsch wax as a possible feed for producing lubricating base oils, this reference is primarily concerned with feeds produced from conventional petroleum-derived waxy feedstocks, such as slack wax. Miller never discusses the hydroisomerization of middle distillates or the selective production of low pour point diesel from the isomerization/hydrocracking of Fischer-Tropsch waxes. Therefore, one skilled in the art would have no basis for concluding that the catalysts taught in Miller have any selectivity for middle distillates.

It should also be noted that the catalysts used in Miller are crystalline materials. The catalyst employed by Calemma et al. is an amorphous silica/alumina catalyst. There is simply no teaching in either reference which suggests combining the teachings of Calemma et al. and Miller in the manner done in the

Office Action. Again nothing in Boucher et al. overcomes the problems with the Calemma et al. and Miller references.

It is well established that there must be some logical reason apparent from positive concrete evidence of record that justifies the combination of the primary and secondary references. *In re. Regal, Buchel and Pempel*, 188 USPQ 136 (CCPA, 1975). The mere identification of prior art statements that, in the abstract, appear to suggest the claimed limitation does not establish a *prima facie* case of obviousness without a finding as to a specific understanding or principle within the knowledge of the skilled artisan that would have motivated one with no knowledge of the invention at issue to make the combination in the manner claimed by Applicants. *In re Kotzab*, 55 USPQ 1313 (CAFC, 2000). Therefore, Applicants argue that the combination of Calemma et al., Boucher et al. and Miller is not proper and that the claims in the present application are patentable over the teachings of the three prior art references. Applicants respectfully request that the rejection of Claims 16-21 and 24-31 as obvious under 35 USC 103(a) be withdrawn.

Summary

Applicants have argued that Claims 15, 22 and 23 are unobvious over the combination of Calemma et al. in view of Boucher et al. It has been argued that Applicants' claims may be distinguished from the primary reference in that

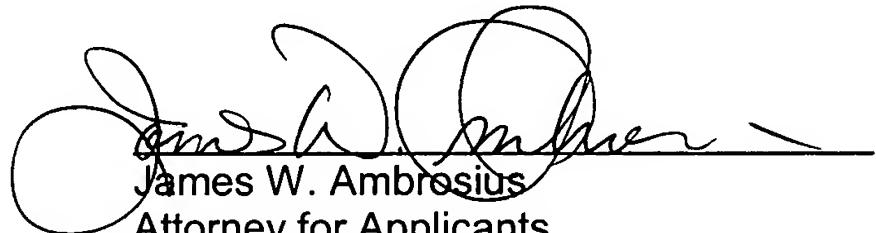
- (a) Applicants' invention uses a hydroisomerization step while the primary prior art reference, Calemma et al., uses a hydrocracking step to prepare the products described in that reference;
- (b) Calemma et al. employs an amorphous silica/alumina catalyst for carrying out the hydrocracking step while Applicants use a crystalline catalyst in performing the hydroisomerization reaction;
- (c) Applicants' process is intended to make a high quality lubricating base oil while Calemma et al. makes no lubricating base oil and is only concerned with

making kerosene and gas oil; and (d) the cold flow properties of the final products of the Calemma et al. process and Applicants' process differ significantly.

Applicants have also argued that the rejection of Claims 16-21 and 24-31 as obvious over the combination of Calemma et al., Boucher et al. and Miller cannot be sustained. It has been noted that there is no basis for one skilled in the art to combine the teachings of Miller with the other references, and consequently, the combination is not proper. The catalysts described in Miller are only taught as useful for the isomerization of high boiling hydrocarbons to prepare lubricating base oils. There is no suggestion in Miller that his catalyst would be selective for preparing middle distillate. The catalysts taught in Calemma et al. are described as selective for middle distillates. Calemma et al. is not interested in preparing lubricating base oils and does not describe their preparation. Thus there is no common thread which ties these two references together.

It is submitted that the claims remaining in the case are patentable over all of the art of record. Accordingly, it is requested that the rejection of Claims 15, 22 and 23 and of Claims 16-21 and 24-31 based upon 35 USC 103(a) be withdrawn. Allowance of all remaining claims in the case and the passing of this application to issue in due course are earnestly solicited.

Respectfully submitted,



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